

## FOUNDATIONS

### WHEN TO CONSIDER

NEEDS ASSESSMENT	NO	SCHEMATIC DESIGN	YES
MASTER PLANNING	MAYBE	DESIGN DEVELOPMENT	DONE
PROJECT STATEMENT	YES	CONSTRUCTION	
ARCHITECTURAL		DOCUMENTS	DONE
PROGRAMMING	NO	CONSTRUCTION	DONE
NO-Need not consider.			
MAYBE-This system may be considered.			
YES-This system should be considered.			
DONE-This system should have already been considered.			

### DESCRIPTION

The foundation system of and the soils beneath the building prevent the complex from moving vertically. When a load is placed on soil, most soils settle. This creates a problem when the building settles but the utilities do not. Even more critical than settlement is differential settlement. This occurs when parts of your building settle at different rates, resulting in cracks, some of which may affect the structural integrity of the building. Conversely, in some rare instances soils may swell, pushing your building upwards and resulting in similar problems. Therefore, the foundation system must work in tandem with the soils to support the building.

### RELATIONSHIP TO OTHER SYSTEMS

The type of foundation system selected depends on the soils, loads and the structural system. If you encounter unusual foundation problems, consider more than one option to ensure the least risk and the most cost effective solution to the problem.

### ALTERNATIVES

Unfortunately, deciding what type foundation to use can't be based on how much money you have in your budget or how much you can afford. Often the soil conditions will dictate the type of foundation that has to be used. If you find your foundation design is costly because of soils conditions, you may want to get a second opinion to verify that the solution is appropriate, that there is not a less expensive alternative, or that the alternative selected is overly conservative.

### Spread Footings

Spread footings generally are square reinforced concrete column supports 12 to 24 inches deep. Each spread footing supports a point load of the columns above. This is a simple and inexpensive approach to be used with good soils.

### Strip Footings

Strip footings, wall footings and thickened slabs are used to support linear loads such as bearing walls. They

provide a simple and inexpensive approach to be used with good soils.

## Grade Beams

Grade beams are like strip footings supported by spread footings. They are used when both columns and bearing walls support the building's loads. They offer a simple and inexpensive approach to be used with good soils.

## Imported Fill

Often soil close to the surface is unsuitable for building. This soil may be removed and replaced with good soil (fill). Afterward, one of the foundation systems can be used. The cost depends on the depth of the poor soils and the distance which good soils must be transported.

## Mat Foundation

A mat foundation system acts like a raft floating on water. The slab on grade becomes thick enough so the entire building acts as a single load applied over the entire slab surface. This is used when you have poor soils. It is used less frequently than the previous systems mentioned.

## Pile Foundations

Pile foundations are deep foundations consisting of concrete, precast concrete or steel. The pile is a slim member either injected or hammered into the ground. Generally multiple piles are inserted next to each other. They are joined by a pile cap acting much as a spread footing would in supporting a column load.

Pile foundations support a load primarily by depending on the friction created between the sides of the pile and the soils. The longer the sides and the more piles, the greater the system's load capacity.

## Caissons

Caisson foundations are deep foundations which use holes drilled and filled with reinforced concrete. The caisson is a wider member than the pile; its radius is greater than the column it is supporting. Unlike the pile, which gets its support from the sides, the caisson also depends on its bearing capacity the capacity of the soil or rock below the caisson which supports it. The greater the caisson diameter, the larger the area, the greater the bearing capacity. To use the bearing capacity, the depth of the caisson needs to reach either rock or load bearing soils.

## Foundations Matrix

		ALTERNATIVES							
		SPREAD FOOTINGS	STRIP FOOTINGS	GRADE BEAMS	IMPORTED * FILL	MAT FOUNDATION	PILE FOUNDATION	CAISSON FOUNDATION	
<input type="radio"/> SOMETIMES APPROPRIATE  <input checked="" type="radio"/> APPROPRIATE	COST								
	LOW	●	●						
	MEDIUM			●	○	●	●	●	

